

## Of mice and their environments. (Letters).(Letter to the Editor).

By: J. C. Crabbe and [Douglas Wahlsten](#)

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### **Article:**

John Bohannon's article "Can a mouse be standardized?" (News Focus, 20 Dec., p. 2321) cites differences in data between our laboratories in support of his argument that early rearing environments, especially caging and housing conditions, are important for results of behavioral tests of mice. However, his claim that "results varied wildly between labs" is inaccurate. We presented data for eight genetic strains of mice on five behavioral tests in three labs (1). For two tests, ethanol preference and water escape learning, the three labs obtained essentially the same results. For open field activity and cocaine activation, data for five of the strains were very similar in the three labs, whereas we obtained quite different results for three genetic groups derived from the 129 strain. Only on a test of anxiety was the variation among labs close to the magnitude of genetic variation; mice tested in Edmonton were generally less anxious than those tested in Portland. This very real environmental effect had nothing to do with early housing conditions; mice of a given strain were shipped from the same supplier on the same day to the three labs 6 weeks after birth and had identical environments before shipping.

There have been several studies over the past four decades on strain-specific behavioral effects of early environmental conditions, and behavioral geneticists aware of this extensive literature did not react with "horror" to our findings, contrary to what Bohannon writes. In a survey of scientific papers that cited our 1999 study (1) and mass media coverage, we reported in the *Journal of Neurobiology* (not the *Journal of Neuroscience*, as stated in the article) that most scholars interpreted the data quite reasonably, whereas journalists sometimes added a sensational twist to the data and missed the main point altogether (2).

Bohannon alleges that husbandry effects were important for our results with 5-HT1B null mutant mice (which were developed by Rent Hen of Columbia University, not by Crabbe). In 1996, these mutants were found to drink more alcohol than wild types (3), whereas 3 years later, three laboratories found no mutation effect on alcohol preference (1, 2). Bohannon states that "Crabbe concluded that subtle differences between laboratory environments were behind these divergent results." In fact, we concluded that the difference between the 1996 and 1999 results was probably due to genetic background effects (1, 2), a contention supported by Hen (4).

The roles of housing conditions and husbandry are worthy topics for future research by behavior geneticists, but extant data on things such as cage size and effects of adding tunnels or toys to the mouse cage are sparse. We simply do not know whether changing the caging of lab mice will markedly alter the outcomes of a wide range of genetic experiments on behavior. More research should be done, but it should not be guided by preconceptions about the outcome, nor by continuing to assume that genes affect concepts such as "intoxication" or "anxiety" rather than much more discrete aspects of the behavioral assays employed (1, 5).

### **References**

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- (3.) J. C. Crabbe et al., *Nature Genet.* 14, 98 (1996).
- (4.) R. Hen, *Science* 285, 2068 (1999).
- (5.) N. Rustay, D. Wahlsten, J. C. Crabbe, *Proc. Natl. Acad. Sci. U.S.A.*, in press.